

Annual Report to the Nation on the Status of Cancer, 1975–2009, Featuring the Burden and Trends in Human Papillomavirus (HPV)–Associated Cancers and HPV Vaccination Coverage Levels

Ahmedin Jemal, Edgar P. Simard, Christina Dorell, Anne-Michelle Noone, Lauri E. Markowitz, Betsy Kohler, Christie Ehemann, Mona Saraiya, Priti Bandi, Debbie Saslow, Kathleen A. Cronin, Meg Watson, Mark Schiffman, S. Jane Henley, Maria J. Schymura, Robert N. Anderson, David Yankey, Brenda K. Edwards

Manuscript received August 15, 2012; revised October 18, 2012; accepted October 19, 2012.

Correspondence to: Ahmedin Jemal, DVM, PhD, Surveillance Research Program, American Cancer Society, 250 Williams St NW, Atlanta, GA 30303 (e-mail: ajemal@cancer.org).

- Journal of the National Cancer Institute, ePub January 7, 2013; print: February, 2013 (issue 3)

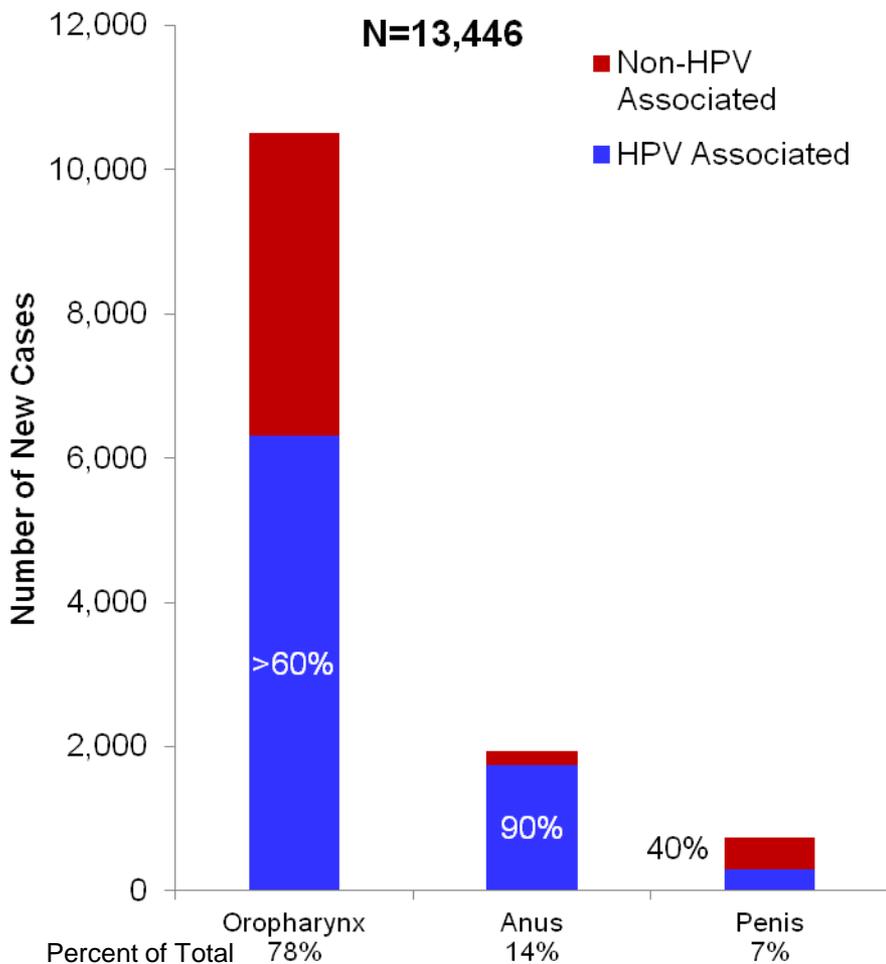
Disclosure

- I am an inventor of NIH vaccine technology that has been licensed to Merck and GlaxoSmithKline, the two companies that manufacture the vaccine.

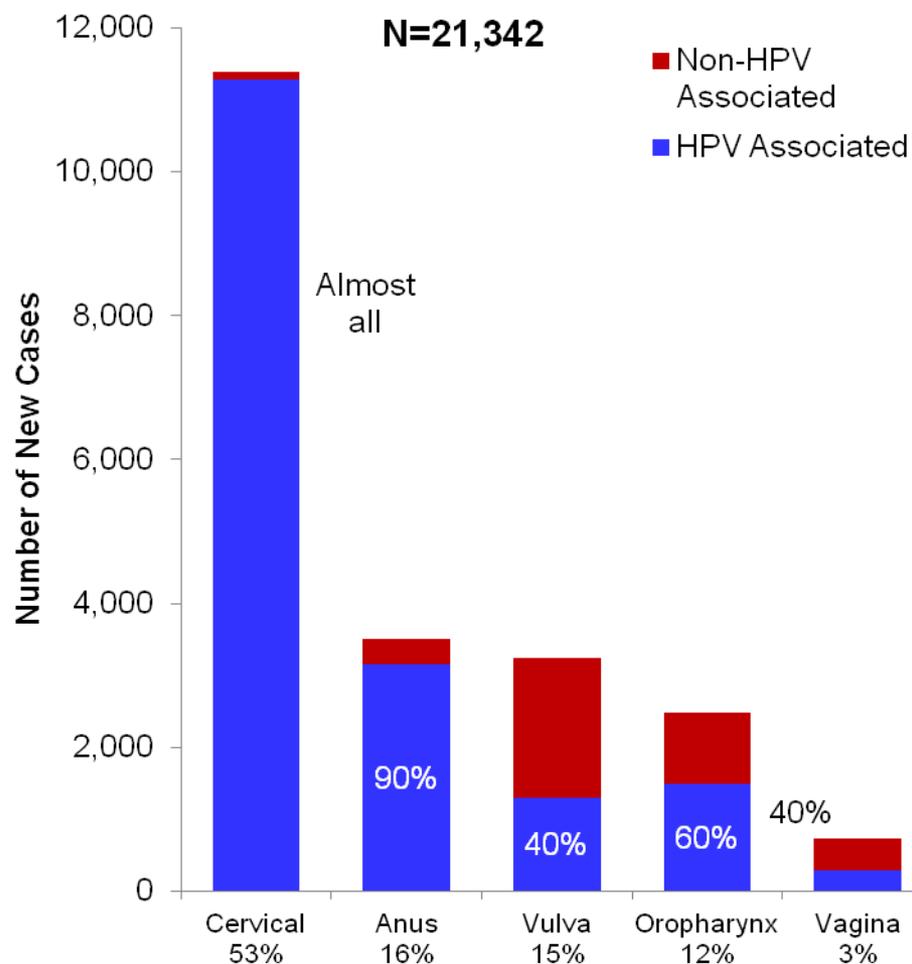
Number of New HPV-Associated Cancers 2009



Men N=13,446



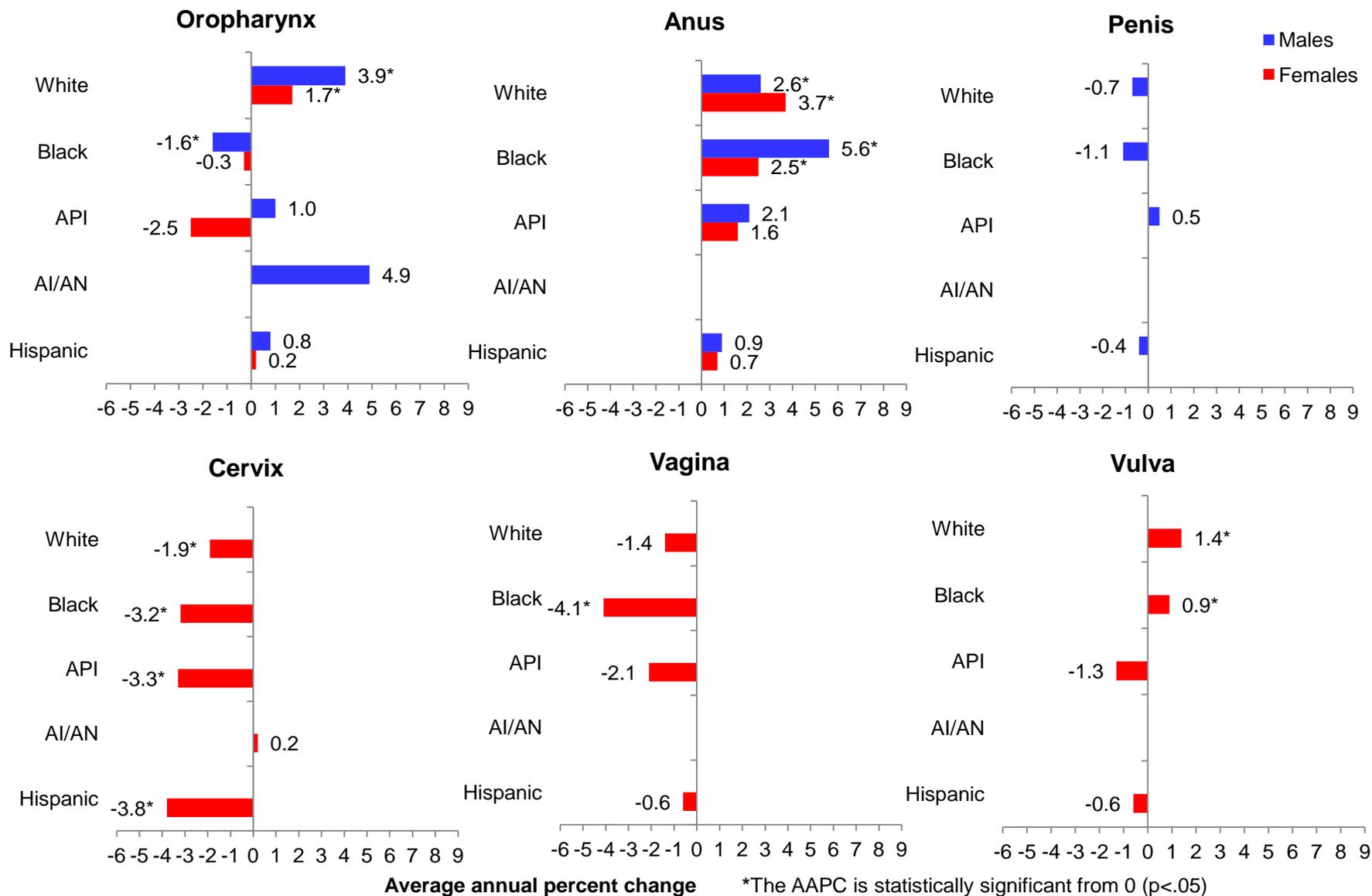
Women N=21,342



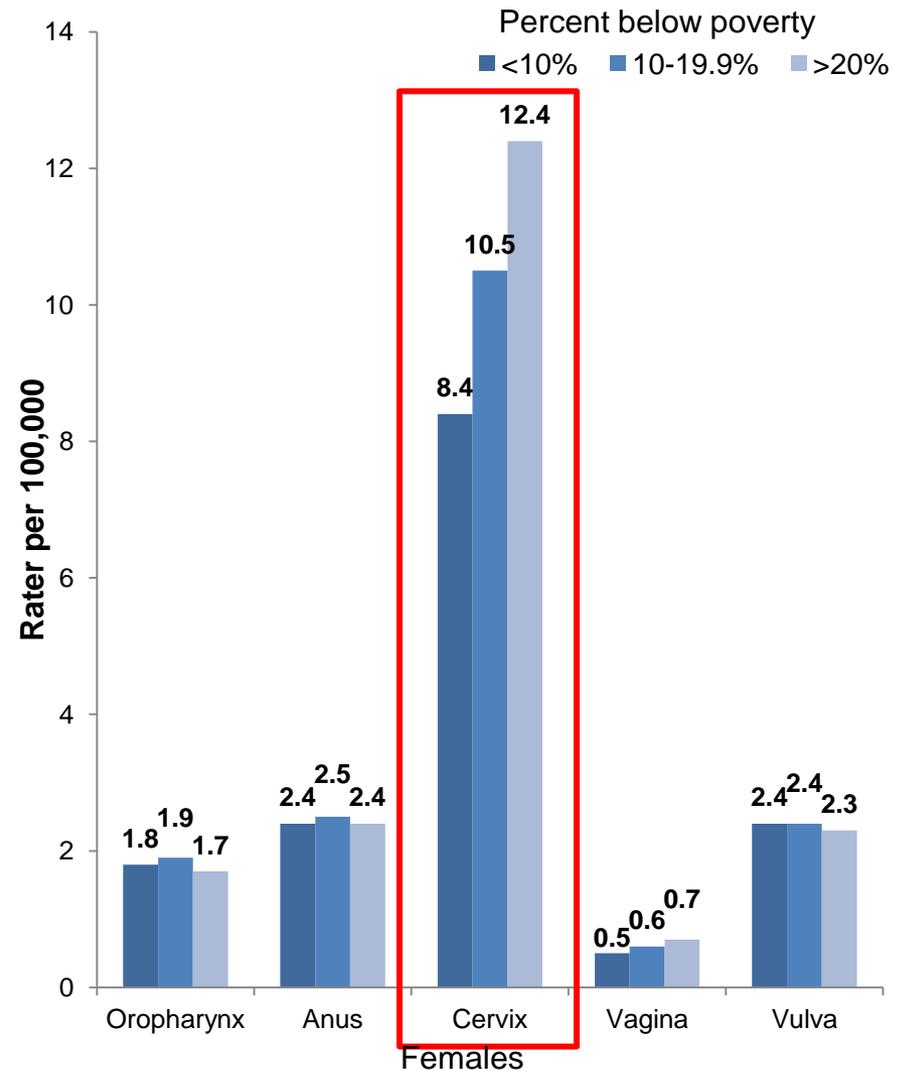
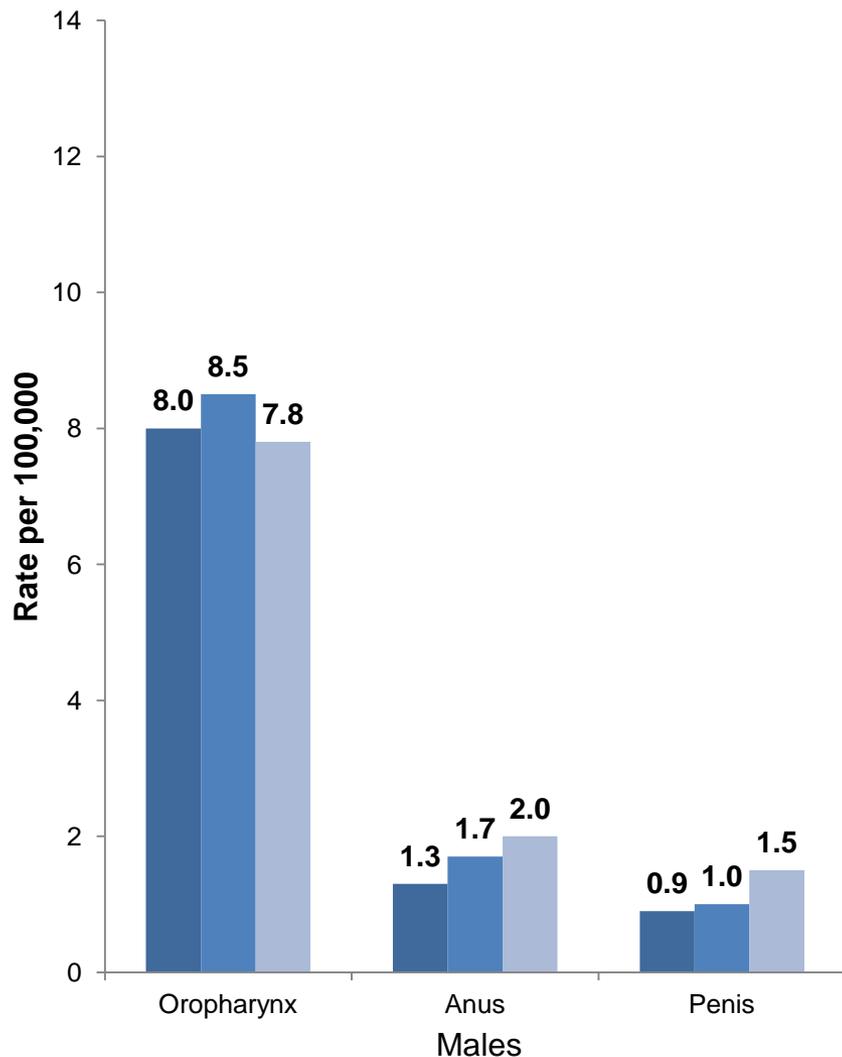
Public Health Interventions Against HPV-induced Disease

- Screening to identify pre-cancer (secondary prevention)
 - Approved for cervical cancer screening
 - Start at 21, stop at 65, can include HPV testing if over 30
- HPV vaccination (primary prevention)
 - Approved for prevention of cervical cancer, other anogenital cancers, and genital warts; plausible to be protective against cancer at other sites

Trends in HPV-Associated Cancer Incidence Rates in the US 2000–2009

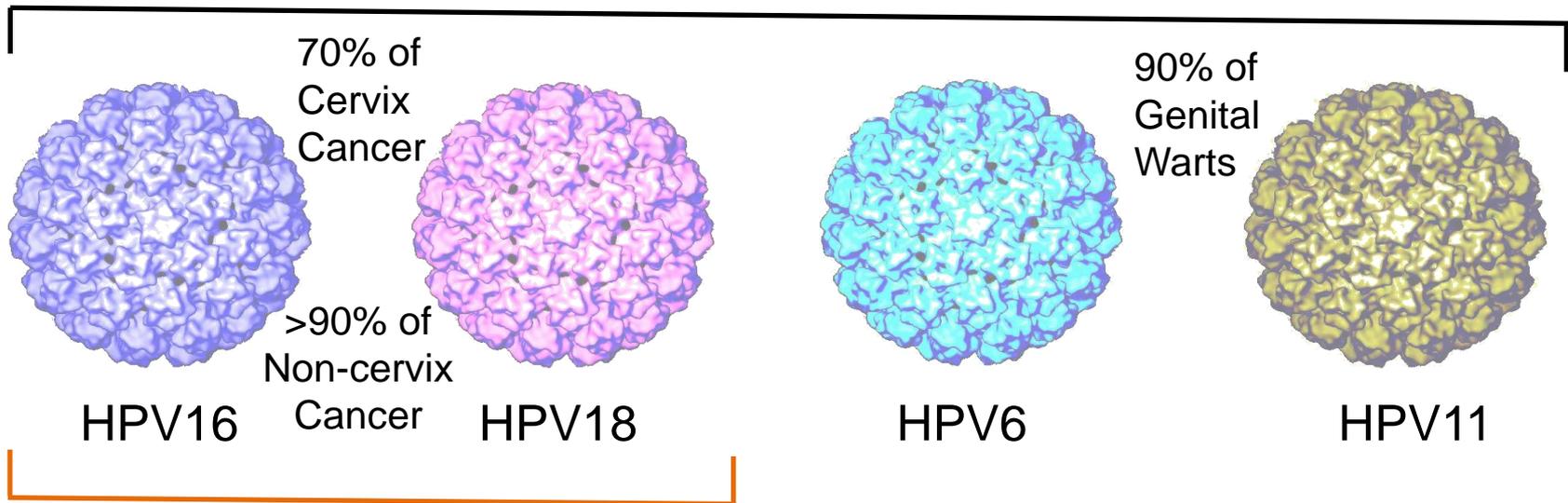


Age-Adjusted Incidence of HPV-Associated Cancers by SES 2005-2009



The Commercial Vaccines Are Composed of Multiple Types of HPV L1 VLPs

Gardasil (Merck)



Cervarix (GlaxoSmithKline)

- *Approved for females (both) and males (Merck)*
- *Target group: 11-12 year olds, catch-up to 26*
- *Three intramuscular injections over 6 months*



Contents lists available at SciVerse ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine



Monitoring the safety of quadrivalent human papillomavirus vaccine: Findings from the Vaccine Safety Datalink[☆]

Julianne Gee^{a,*}, Allison Naleway^b, Irene Shui^c, James Baggs^a, Ruihua Yin^c, Rong Li^c, Martin Kulldorff^c, Edwin Lewis^d, Bruce Fireman^d, Matthew F. Daley^e, Nicola P. Klein^d, Eric S. Weintraub^a

^aImmunization Safety Office, Division of Healthcare Quality and Promotion, Centers for Disease Control and Prevention, 1600 Clifton Rd., Atlanta, GA 30333, USA

^bCenter for Health Research, Kaiser Permanente Northwest, Portland, OR, USA

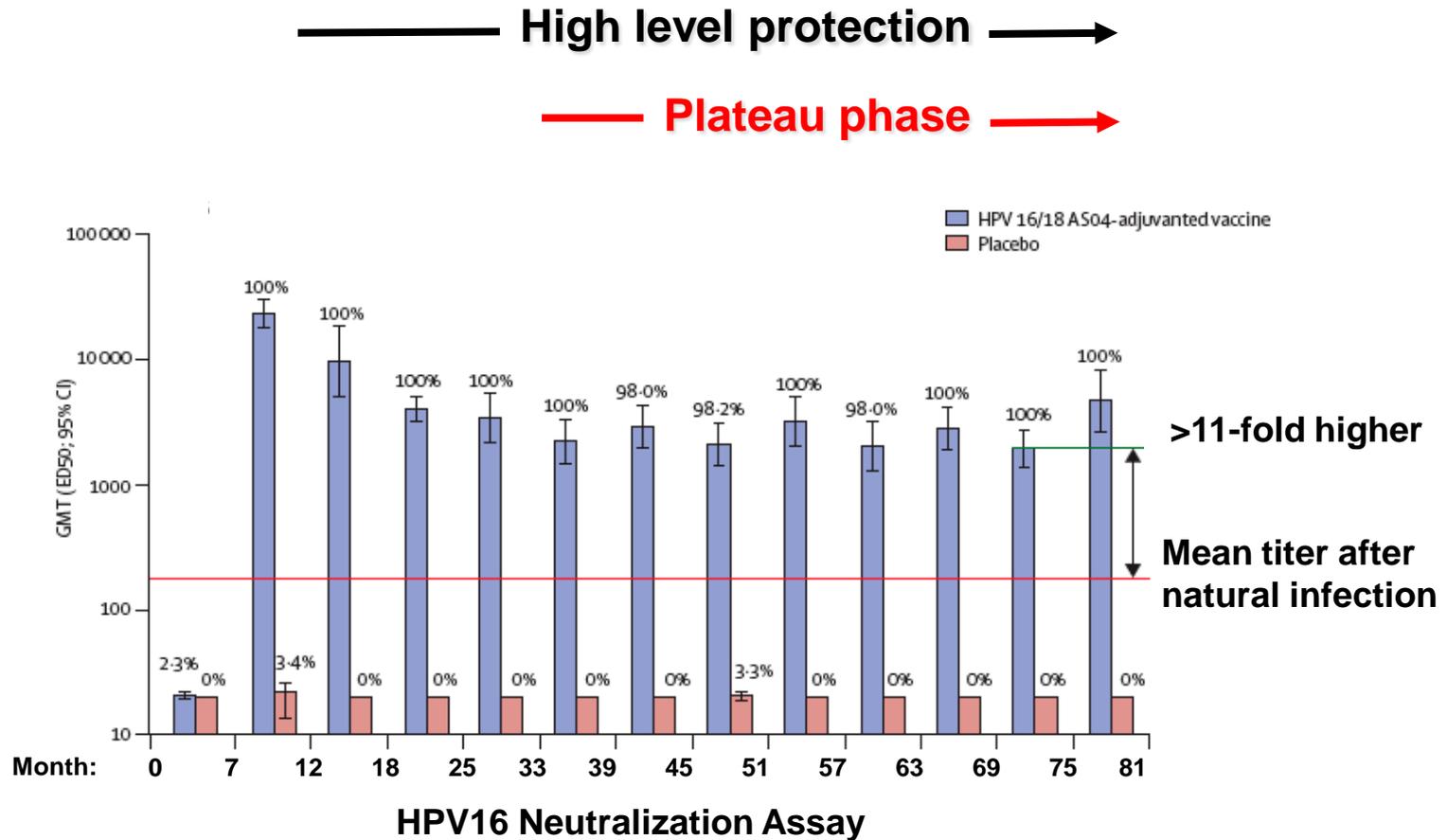
^cDepartment of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, MA, USA

^dVaccine Study Center, Northern California Kaiser Permanente, Oakland, CA, USA

^eInstitute for Health Research, Kaiser Permanente Colorado, Denver, CO, USA

- Prospective post-licensure assessment of 600,558 doses (Gardasil) from 7 managed care organizations
- No vaccine-related increased risk to prespecified outcomes: Guillan-Barré syndrome, stroke, venous thromboembolism, appendicitis, seizure, allergic reactions
 - Prespecified outcomes were derived from CDC analysis from VAERS [Vaccine Adverse Events Reporting System]: Slade et al, JAMA 2009
- Rate of anaphylaxis (1 case, 26 y.o.) similar to other vaccines
- Rate of fainting similar to that of other adolescent vaccines

Durability of Antibody Response to Cervarix



From The GSK Vaccine HPV-007 Study Group. *Lancet* 374:301-14, 2009

8.4 years sustained immunogenicity and efficacy: Roteli-Martins et al., Hum Vaccin Immunother 8: 390-7, 2012

Australia: Fall in HPV Prevalence After Initiating National Vaccine Program

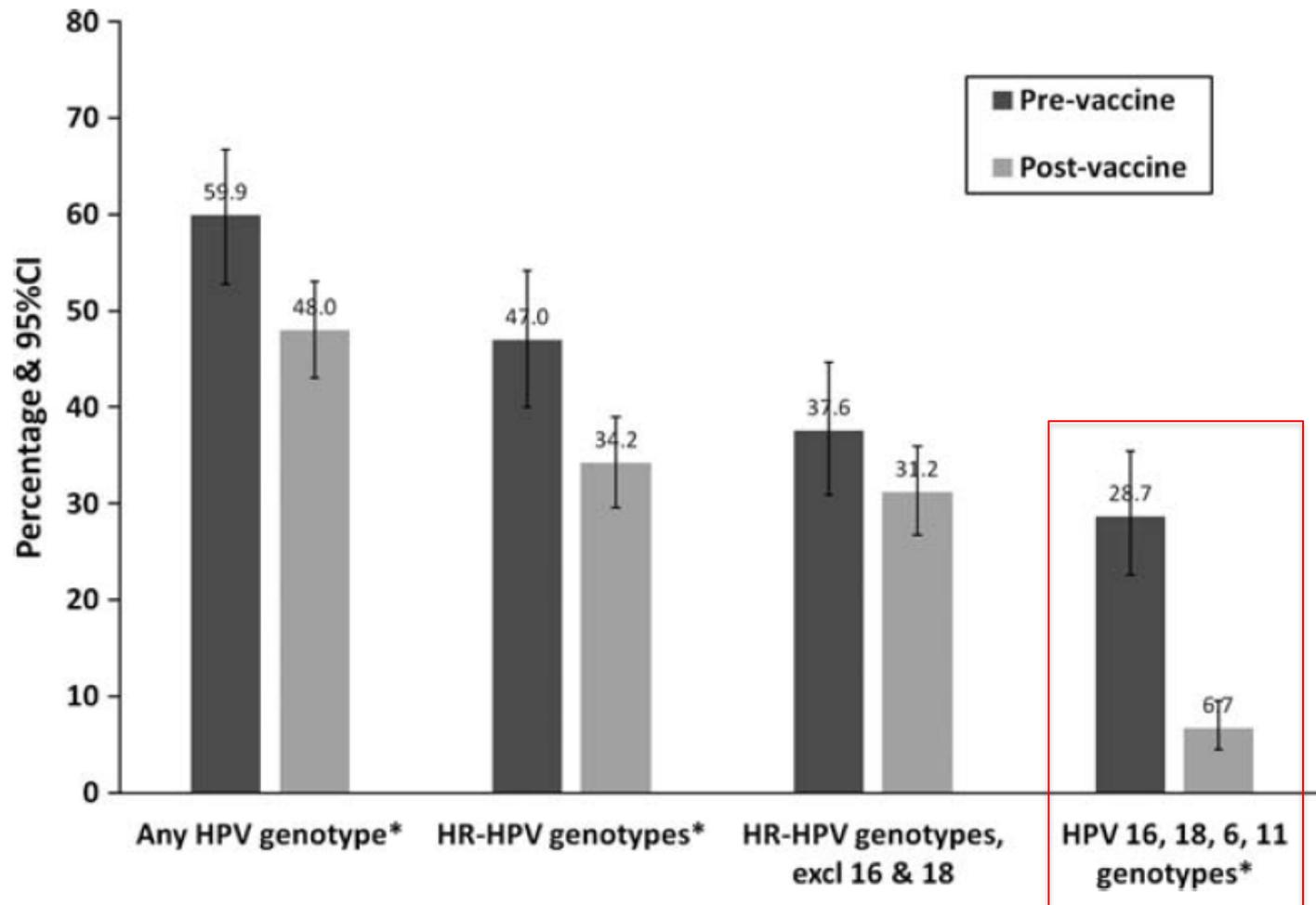


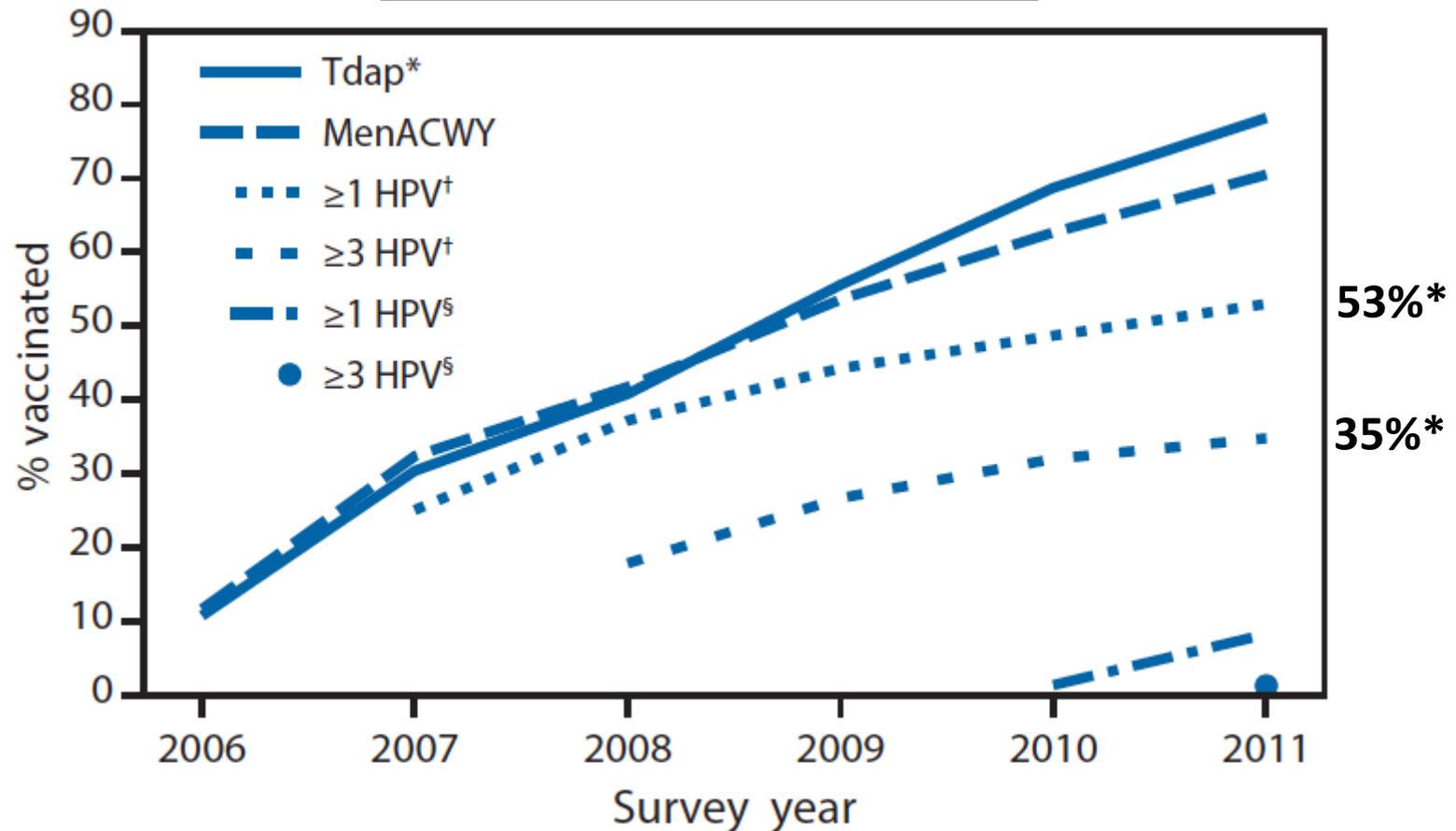
Figure 1. Differences in human papillomavirus (HPV) genoprevalence between prevaccine and postvaccine populations. * $P < .05$ for difference in percentages between groups. Abbreviations: CI, confidence interval; excl, excluding; HR-HPV, high-risk HPV.

NCI-Costa Rica Trial of GSK vaccine in 18-25 year old women: Vaccine Efficacy Against Oral Infection (End-point: HPV16/18 infection)

- **5840 oral swabs at 4-year visit; balanced between control and vaccine group**
- **93% vaccine efficacy (1/16 infections in vaccine group)**
 - 12 HPV16 infections; 4 HPV18 infections
- **Suggestive evidence that HPV vaccination may protect against oropharyngeal cancer attributable to HPV infection**
- *Rolando Herrero, Allan Hildesheim, Aimee Kreimer and their colleagues, submitted*

Trends in U.S. Vaccination Rates: Ages 13-17 Yrs

MMWR Vol 61, #34, August 31, 2012



* Females; adolescent male vaccination 8.3%

Abbreviations: Tdap = tetanus, diphtheria, acellular pertussis vaccine; MenACWY = meningococcal conjugate vaccine; HPV-1 = human papillomavirus vaccine, ≥1 dose; HPV-3 = human papillomavirus, ≥3 doses.

* Tdap and MenACWY vaccination recommendations were published in March and October 2006, respectively.

† HPV vaccination recommendations were published in March 2007.

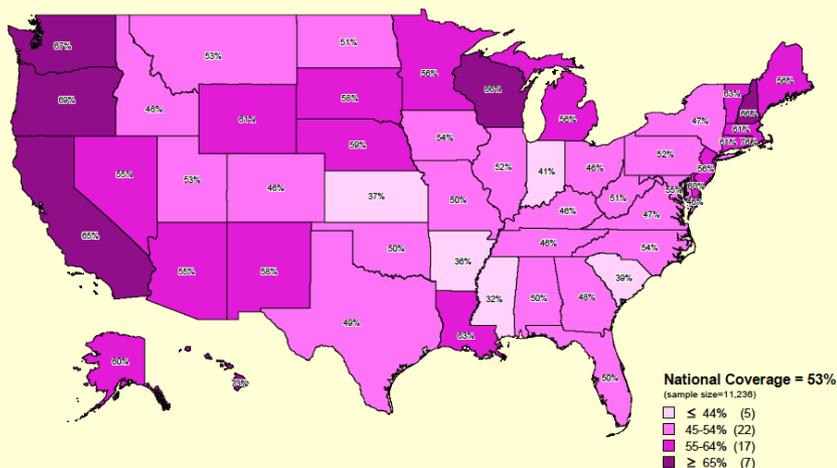
USA: 2011 HPV and Meningococcal Vaccination Rates for 13-17 year olds

	HPV vaccine 1 dose or more only girls	Meningococcal vaccine 1 dose or more
United States	53%	70%
Below poverty	62% (boys:14%)	69%
Above poverty	50% (boys: 7%)	71%
Hispanics	65%	75%
Blacks	56%	72%
Whites	48%	68%

From MMWR August 31, 2012

HPV vaccine uptake: 2011

**Coverage of 1 or More Doses of HPV*
Female Adolescents Aged 13-17 Years Old, 2011**

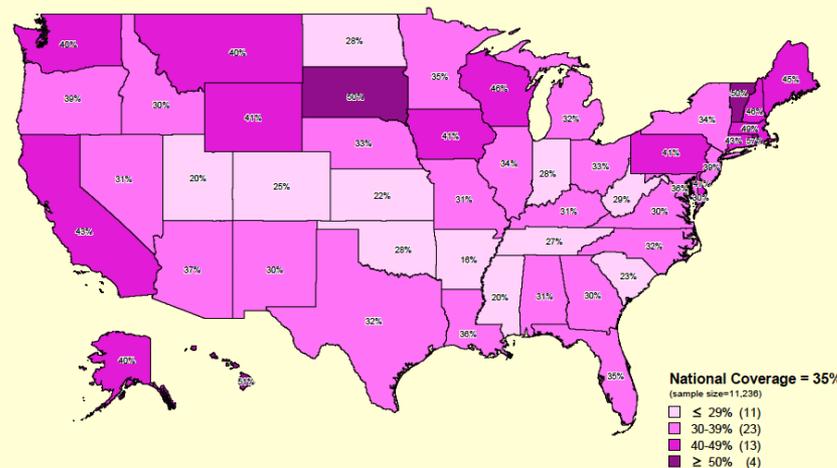


Note 1: *Human Papillomavirus Vaccine, either quadrivalent or bivalent. Percentages reported among females only.

Note 2: Includes female adolescents born between January 1993 and February 1999
Source: National Immunization Survey - Teen (NIS - Teen)



**Coverage of 3 or More Doses of HPV*
Female Adolescents Aged 13-17 Years, 2011**



Note 1: *Human Papillomavirus Vaccine, either quadrivalent or bivalent. Percentages reported among females only.

Note 2: Includes female adolescents born between January 1993 and February 1999
Source: National Immunization Survey - Teen (NIS - Teen)

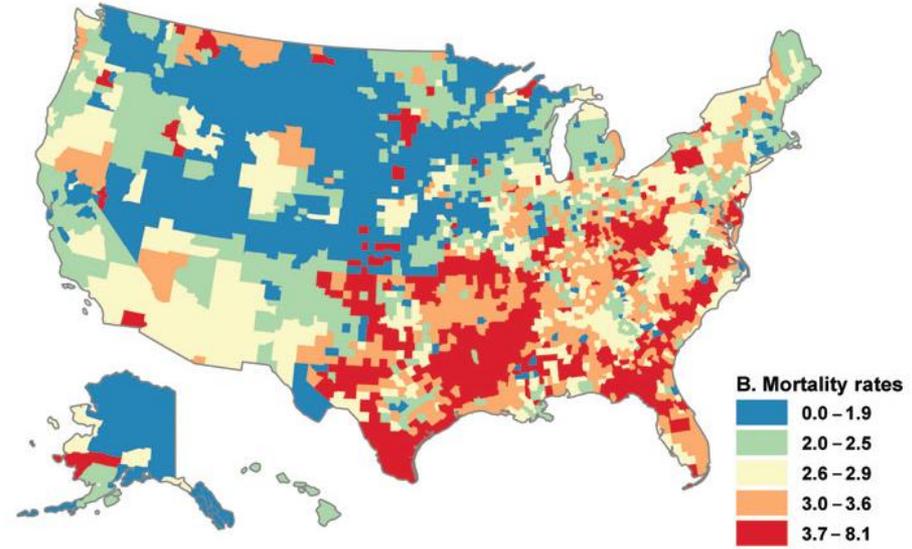
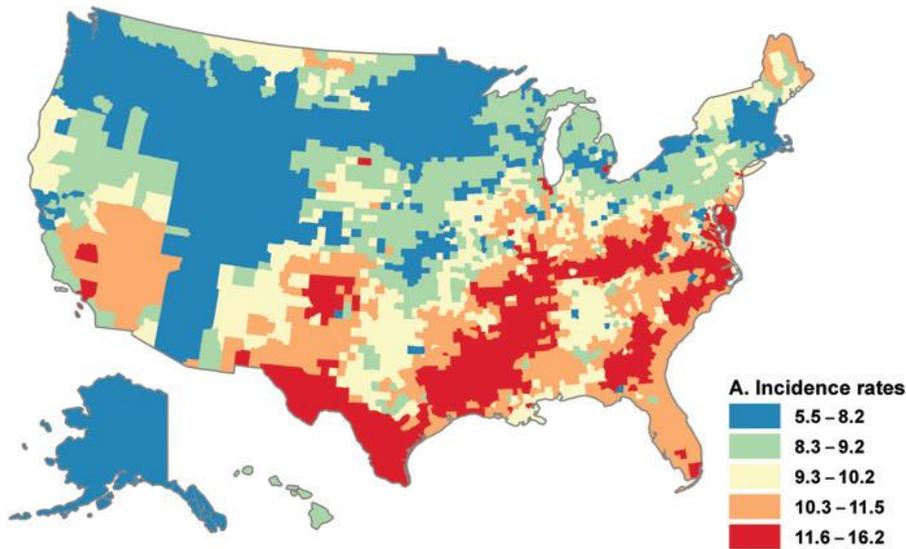


- Vaccination uptake rates vary widely among states: from 32% to 76% for 1 dose, from 16% to 57% for 3 doses

USA: Wide Regional Differences in Cervical Cancer Incidence and Mortality Rates

Incidence Rates

Mortality Rates



Suggested Reading

- Jemal et al, Annual Report to the Nation on the Status of Cancer, 1975–2009, Featuring the Burden and Trends in Human Papillomavirus (HPV)–Associated Cancers and HPV. J Natl Cancer Inst ePub Jan 7, 2013; print Feb, 2013
- Siegel et al, Cancer Statistics 2013. Ca Cancer J Clin 63: 11-30, 2013
- Moscicki et al, Updating the natural history of human papillomavirus and anogenital cancers. Vaccine Suppl 5: F24-33, 2012
- Zandberg et al, The role of human papillomavirus in nongenital cancers. Ca Cancer J Clin 63: 57-81, 2013

Thank you!